# ANTHRAX in ALBERTA: WILDLIFE IMPLICATIONS

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## *BIOLOGY*

Anthrax is an acute infectious disease caused by the spore-forming bacterium *Bacillus anthracis*. Spores can persist in soil for long periods, possibly hundreds of years. All warm-blooded animals are susceptible to differing degrees. It is highly infectious to humans and fatal in most herbivores. Although more resistant, carnivores can be infected if they eat enough infected meat.

Transmission in wildlife generally involves ingestion of spores via food or water or inhalation of aerosol spores. Bison wallows may be a common source for the latter transmission. Infection in humans is rare but occurs in association with carcasses through inhalation of spores or direct entry of spores via superficial wounds. Biting flies that feed on carcasses may transmit bacteria from the blood and non-biting flies may transfer spores from carcasses to vegetation.

Once infected, the virulent spores germinate and develop a protective coating that prevents their destruction by the host immune system. They then produce a toxin that causes localised accumulation of tissue fluids (oedema), an excellent medium for growth of more bacteria. Rapid multiplication and bacterial showers into the blood result in toxic shock and rapid death of the host. Death can occur within a few hours or days. Clinical signs are minimal and generally carcasses are the first indication of a problem.

Fortunately bacteria within the carcass cannot sporulate and are killed by putrefaction within 3-4 days. However, if exposed to air, the bacteria quickly sporulate and become a source of future infections. Carnivores play an important role in opening carcasses and contaminating the death-site with spores. Rarely, migratory birds may transfer spores on their feet or feathers.

## *DIAGNOSIS*

DO NOT OPEN A SUSPECT CARCASS. DO NOT MAKE DIRECT CONTACT WITH BLOOD OR FLUIDS FROM A SUSPECT CARCASS. DO NOT STAND DOWN WIND OF A SUSPECT CARCASS.

Anthrax carcasses generally putrefy rapidly and the blood fails to clot. Any herbivore found to be severely bloated, with dark tarry blood or thin blood-stained discharges from the nostrils and anus should be considered suspect. Swellings in various parts of the body also may occur. Swelling around the throat apparently is a common feature in carnivores.

Diagnosis can be made on tissue containing infected blood. The recommended diagnostic material is an ear from the suspect carcass. The recommended collection technique is to put a plastic bag over your gloved hand and grasp the ear to be removed. Cut off the ear and draw it into the bag. Secure the bag then cover with 2 or three more secured bags. Label as hazardous material. If possible, keep tissue cool.

Anthrax is a federal reportable disease and the Canadian Food Inspection Agency (CFIA) is the lead agency on any suspect case. Diagnostic material should be submitted to a federal veterinarian. Material also can be submitted to Alberta Agriculture diagnostic labs for them to forward to CFIA. Thoroughly disinfect all

equipment with strong solutions (10-20%) of formalin, chlorine, or lye. Burn gloves and facemasks as well as any clothing contaminated with blood or fluids from the carcass.

Take a GPS reading of the location but take no further action with the carcass. Depending on the lab results, CFIA in conjunction with AENV will determine subsequent procedures.

Anthrax is a zoonotic disease and can infect humans. Antibiotic treatment is effective. If left untreated infections may resolve or may be fatal. Symptoms usually occur within seven days. Skin infections are associated with a raised itchy lump (like a mosquito bite) that develops into a fluid-filled blister and then a painless ulcer 1-3 cm in diameter with a black necrotic core. Inhalation is associated with flu-like symptoms that progress after several days to breathing difficulties and shock. Anyone exhibiting these symptoms after contacting a suspect carcass should consult a physician immediately.

## *MANAGEMENT IMPLICATIONS*

In Alberta, anthrax occurs sporadically in bison associated with Wood Buffalo National Park and in cattle in central Alberta. Outbreaks in WBNP occurred in 1991 and 2000. The latter outbreak also included an infected black bear. The most recent cases in cattle occurred in 1974, 1981, 1991, and 1999. There were additional cases in bison in the Mackenzie Bison Sanctuary, NWT in 1993.

Specific conditions for activation of dormant spores are poorly known; however, outbreaks often are associated with rainy weather followed by a hot dry summer. Localized floods or periodic inundation of low-lying areas also may precede a problem and may expose and concentrate spores. This may account for concentration of spores in wallows and subsequent outbreaks in bison.

Any suspect carcass should be approached and handled with extreme care. Protective clothing, including gloves, eye-wear, and a face mask should be used. DO NOT OPEN THE CARCASS. Treat all diagnostic materials as a biohazard and triple bag and tag accordingly (see above). Thoroughly disinfect or burn anything contaminated with blood or fluids from a suspect carcass.

Given the rapid putrefaction of carcasses, any hunter-killed animal would rot quickly. In such cases it is likely the hunter would contact appropriate authorities to determine whether the meat was safe to eat or to request a replacement tag.

**Anthrax within free-ranging wildlife in Alberta, exclusive of bison, is extremely rare and only occurs in conjunction with outbreaks in bison or cattle. Human cases are extremely rare but precautions are warranted in all suspect situations.**

NRS field staff may receive calls from the public regarding this disease. Topics could include 1) the risk to wildlife, 2) the risk to people, and 3) the risk to hunters or people handling and consuming infected animals. The above information will assist in responding. If callers require more detailed information they should be referred to CFIA (for information regarding specific disease control programs), Alberta Health (for medical concerns), or the Wildlife Disease Specialist in Edmonton (for wildlife perspectives).

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